

# Blockchain Technology in the Public Sector

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Tuesday, August 21, 2018



# **Introduction to Blockchain**

#### The Basics

Decentralized

Peer-to-Peer

Ledger of Transactions

**Public or Private** 

#### What is it?

- A database, or ledger of transactions
- Shared across a network of computers (or "nodes")
- Transactions are validated, grouped (in "blocks") and secured using cryptography
- Blocks are published to the Blockchain and linked to the prior block on the chain in a linear architecture

#### **Use Examples**

Cryptocurrencies (Bitcoin, Etherium) or Smart Contracts

Further reading: A Reuters Visual Guide: Blockchain Explained (June 15, 2018), https://graphics.reuters.com/TECHNOLOGY-BLOCKCHAIN/010070P11GN/index.html



#### Steps:

1

#### · Build a Transaction

• i.e., "Johnny sends Sally 10 bitcoins"

2

#### Sign the Transaction

- Private Key: ?????
- Public Key: 1CmYceGTrRCjdWgnkgZ5uKrMDVj2nBoNf490sa

3

#### Broadcast the Transaction over the network

· Verification and reaching consensus

4

#### Mining of the Transaction

- "Miners" bundle transactions and solve cryptographic puzzle ("hashing")
- Block is published to the chain, verified by nodes, and the miner gets Bitcoin reward



#### **Smart Contracts**

- Small computer program that uses a Blockchain for execution
- Creates self-executing contracts
- Terms of agreement are written into lines of software code using "if/then" statements
- Elements
  - 1. Transaction resides on a blockchain
  - 2. Involves two or more parties
  - 3. Implementation is autonomous
    - Requires little to no human intervention
    - Cheaper, faster, less ambiguous

Reimbursements for employee travel Determine and govern social aid packages Recording real estate transactions



#### **Advantages & Disadvantages**

#### **Advantages**

- Reduced cost
  - Decentralized nature can reduce or eliminate the costs of a centralized intermediary
- Improved data integrity
  - No single point of failure and transactions are near real time
- Secure and Immutable
  - Consensus and blockchain structure create secure, immutable database
- Transparency
  - Finalized transactions are verifiable by anyone if public or everyone permissioned into the environment on private

#### **Disadvantages**

- Storage
  - Requires storage of large amounts of data, increasing short-term costs for equipment
- Data Quality
  - Quality of data relies on quality of data input at the origin
- Immutability
  - No way to remove data that has been entered, so not ideal for instances where updating and/or deleting data is a regular occurrence
- Privacy
  - "right to be forgotten" laws on non-permissioned chains



#### Potential in Public Sector 1

Improve effectiveness

Reduce friction between agencies

Reduce bureaucratic barriers

Better share of knowledge and information

Foster automation through smart contracts

<sup>&</sup>lt;sup>1</sup> Berryhill, J., T. Bourgery and A. Hanson (2018), "Blockchains Unchained: Blockchain Technology and its use in the Public Sector", OECD Working Papers on Public Governance, No. 28, OECD Publishing, Paris. <a href="http://dx.doi.org/10.1787/3c3dc429-en">http://dx.doi.org/10.1787/3c3dc429-en</a>



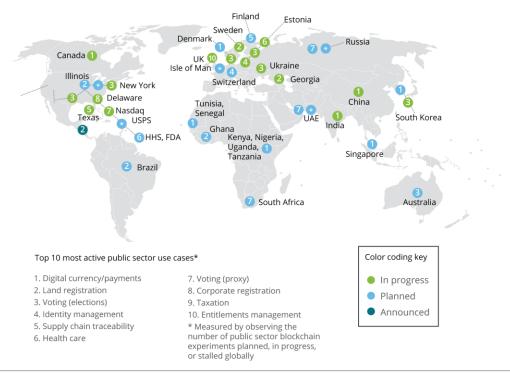


# Other State Action and Initiatives

#### **Blockchain Uses**

Figure 1. Blockchain in the public sector, as of March 2017

Blockchain experiments in the public sector are accelerating globally, with a concentration in the US and Europe.



Source: Deloitte analysis in conjunction with the Fletcher School at Tufts University.



#### **Blockchain Uses**

Figure 6. Blockchain delivers business value in three primary areas—individually and in combination

Value transfer	<ul><li>Low-cost and near real- time</li><li>Without an intermediary</li><li>Beyond "money"</li></ul>	Examples  • Domestic and international remittance  • Internal payments settlement  • Clearing and settlement of securities  • Exchange of low liquidity assets
Smart contracts	<ul> <li>Software protocols</li> <li>Based on ledger content</li> <li>Execute when the conditions are met</li> </ul>	Examples     Digital cheques/IOUs     Automatic financial instruments     Parametric insurance contracts     Automated market making
Recordkeeping	<ul> <li>Create immutable record</li> <li>Under agreed consensus protocol</li> <li>Without reliance on a trusted third party</li> </ul>	Digital certificate of ownership for physical assets     Transaction validation of digital assets     Financial accounts

Source: Deloitte analysis.

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#### **Blockchain Initiatives**



- Government Services Administration
- U.S. Federal Blockchain program for federal agencies and U.S. business interested in exploring blockchain and its implementation within the government

#### Delaware Blockchain Initiative

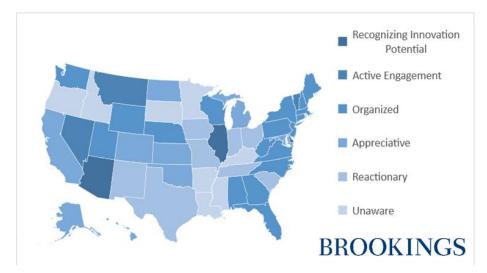
- Announced in 2016
- Program intended to spur adoption and development of blockchain and smart contract in public and private sectors

#### Illinois Blockchain Initiative

- Announced in 2017
- Calls for a consortium of state and county agencies to "collaborate to explore innovations presented by Blockchain and distributed ledger technology



#### **State Action**



Source: Desouza, Ye, and Somvanshi, Blockchain and U.S. State Governments: An Initial Assessment, BROOKINGS, April 17, 2018. https://www.brookings.edu/blog/techtank/2018/04/17/blockchain-and-u-s-state-governments-an-initial-assessment/.

#### Virginia - "Organized"

· Succeeded in passing some legislation in this regard

### **Delaware**, **Illinois**, **Arizona** – "Recognizing Innovation Potential"

 Envisions a broader role for blockchain in their economies and has introduced or passed regulations ranging from making signatures, transactions, and contracts on a blockchain legally valid to allowing residents to pay their income tax in cryptocurrencies

#### Vermont, etc. - "Active Engagement"

 Gone beyond cryptocurrencies and have examined the governmental use of blockchain, either as isolated applications in specific government functions, or as integration across different government functions.



#### Legislation

#### **Arizona**

- <u>HB2601: Securities; Crowdfunding; Virtual coin offerings</u> (Passed: 12 April 2018): Provides the Arizona crowdfunding exemption bill. The exemption applies to virtual coin offerings made in Arizona for Arizona residents. The bill also defines underwriters and security token and utility token.
- <u>HB2603: Corporations; Blockchain technology</u> (Passed: 03 April 2018): States that Arizona is friendly to emerging blockchain technologies.
- <u>HB2602: Running nodes; Blockchain; Regulation Prohibition</u> (Passed: 12 April 2018): Bars towns or local governments from restricting cryptocurrency mining in residences.
- HB2216: Prohibited firearm tracking; Classification (Passed: 18 April 2018): Criminalizes the tracking of firearms on a blockchain.
- <u>HB2417</u> (Passed: 29 March 2018): Defines blockchain technology, explicitly legalizes blockchain signatures, recognizes the validity of smart contracts, and validates blockchain legitimacy generally.

Source: SAGEWISE, Smart Contracts State Legislation, https://www.sagewise.io/smart-contracts-state-legislation/ (last visited August 20, 2018).



#### Legislation

#### **Delaware**

• <u>SB69: An Act to Amend Title 8 of the Delaware Code Relating to the General Corporation Law</u> (Passed: 21 July 2017): Allows corporations to store on a blockchain shareholder lists and other business records

#### Illinois

- <u>HB5553: Blockchain Technology Act</u> (Failed): Would have outlined allowable restrictions on blockchain and would have prohibited local governments from taxing cryptocurrencies.
- HJR25: Blockchain Task Force (Passed: 28 June 2017): Created a task force to study the risks and opportunities of blockchain technology.
- HB5335 (Pending): Would allow the payment of state taxes in cryptocurrency

Source: SAGEWISE, Smart Contracts State Legislation, <a href="https://www.sagewise.io/smart-contracts-state-legislation/">https://www.sagewise.io/smart-contracts-state-legislation/</a> (last visited August 20, 2018).



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#### **Vermont**

- H.868 (Passed: 02 June 2016): Recognized blockchain-based digital records as valid business records under Vermont's rules of evidence.
- <u>H.182</u> (Passed: 04 May 2017): Defined cryptocurrencies as money, thereby bringing them under regulation of the state's money transmitter law.
- <u>S.269</u> (Passed: 30 May 2018): Defined blockchain technology; created studies for evaluating blockchain potential; and created two new forms of companies: personal information protection companies and blockchain-based limited liability companies.
- <u>S.135</u> (Passed: 08 June 2017): Requires an evaluation of blockchain technology, specifically of remote citizenship, smart contracting, and digital signatures; allows for the use of blockchain-based data in court; and permits using blockchain to authenticate art, gemstones, and consumer goods.

Source: SAGEWISE, Smart Contracts State Legislation, https://www.sagewise.io/smart-contracts-state-legislation/ (last visited August 20, 2018).



# Thank You!

## **Questions?**

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